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(54) Blood sugar reduction agent

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Specification

1. Title of Invention
Blood sugar reduction agent

2. Scope of Patent Claims

1. A blood sugar reduction agent characterized by containing as an active ingredient a saccharide selected from a group comprised of polysaccharides that are difficult to digest produced by plants or animals, and derivatives thereof.
2. A blood sugar reduction agent stated in item 1 of the Scope of Patent Claims in which the blood sugar reduction agent is a prevention or treatment agent of a metabolic disease.
3. A blood sugar reduction agent stated in item 1 of the Scope of Patent Claims in which the blood sugar reduction agent is a prevention or treatment agent of a digestive system disease.

3. Detailed Explanation of the Invention
This invention pertains to a new blood sugar reduction agent.
In recent years, metabolic diseases such as high blood sugar, diabetes, obesity and arteriosclerosis due to excessive eating and drinking of saccharides that are easy to digest and absorb, particularly starches and sugars, have been increasing even in Japan. Also, eating habits that tend toward such saccharides that are easy to digest and absorb have become a cause of digestive system diseases such as diarrhea, gastrointestinal catarrh and abnormal enzyme production in the intestines.
However, satisfactory prevention and treatment agents for such diseases have not been offered, and the invention of such has been desired.

Thus, as a result of earnest research, this inventor discovered that polysaccharides and oligosaccharides that are difficult to digest produced by plants or animals, and derivatives thereof, have an excellent blood sugar reduction effect, and thereby achieved this invention.

That is, this invention offers a blood sugar reduction agent that contains as an active ingredient a saccharide selected from a group comprised of polysaccharides that are difficult to digest produced by plants or animals, and derivatives thereof.

Examples of polysaccharides that are difficult to digest produced by plants or animals, and derivatives thereof, include cellulose, carboxyl methyl cellulose, methyl cellulose, ethyl cellulose, nitro cellulose, hydroxy ethyl starch, carboxy methyl starch, mannan, pectin, pectic acid, chitin, chitosan, carboxy methyl chitosan, glycol chitosan, aloe viscous matter, chondroitin sulfate, hyaluronic acid, heparin, luminalin, alginic acid, propylene glycol ester alginate, agar, gum arabic, arabinogalactane, carrageenan, dammar gum, karaya gum, kauri gum, locust bean gun, mastic gum, pontianac [?] gum, storax gum, traganth gum, plantain seed gum, inulin, chitin, xylin, galactomannan, tamarind seed viscous matter, quince seed viscous matter, flax seed viscous matter, okra viscous matter, gingko nut viscous matter and so forth. These saccharides and their derivatives are already publicly known and can be prepared by publicly known methods ("General Polysaccharide Science," last volume (K. Harada, A. Misaki, editors, pp. 172-436, 1974, Kodansha).

The saccharides of this invention can be crude products rather than refined products. The toxicity of the relevant saccharides is a very low 500 mg/kg or less by oral administration, and they can be independent or in a suitable composition, and they can be capsules, pills, liquids or injectable agents. Also, a safety agent can be added to these saccharides, and agents that prevent or treat metabolic diseases or digestive system diseases can also be added. In addition, the relevant saccharides can be used together with preservatives or food additives or foods such as concentrated foods, enzyme-producing foods, animal feeds, fish feeds, health foods and so forth.

It has already been found by this inventor that enzymes that synthesize saccharides that are difficult to digest from saccharides that are easy to digest have a blood sugar reduction effect (A. Endoh, Japan patent application no. S55-41390), and the saccharides of this invention can be used together with these enzymes or amylase or sucrase inhibitors.

The blood sugar reduction agent of this invention can be administered orally, intraperitoneally or intravenously, but oral administration is generally preferable. The dosage depends on the type and degree of the disease, but normally oral administration of 0.1-10 g/day, or in particular 0.2-5 g/day, is preferable.

Implementation examples of this invention are explained below.

Implementation example 1

Male Wister rats of body weight 145-180 g were starved for 24 hours, then given oral administration of 2 g/kg of sugar. At the same time, sugar that was dissolved or suspended in physiological saline solution was administered, and blood was taken from the tail vein after 30 minutes and after 1 hour, and the blood sugar value (blood glucose value) was measured by ordinary methods. As a result, as shown in Table 1, the group that received administration of a difficult-to-digest polysaccharide or oligosaccharide or derivative thereof had a lower blood sugar value than the control group that received administration of only sugar (the numerical values in the table are the average of 5 rats in each group).

Table 1

Sugar	Dosage (mg/kg)	Blood sugar reduction ratio (%) (a)	
		After 30 minutes	After 60 minutes
Konjak mannan	5	<10	<10
Citrus pectin	5	42	18
Carboxy methyl cellulose	5	<10	<10
Guar gum	5	<10	<10
Carrageenan (made from *kappa*)	5	<10	<10
Glycol chitosan	5	67	46

(a) Rise in blood sugar value 30 minutes and 60 minutes after sugar administration (2 g/kg) is used as a reference.

Implementation example 2

The blood sugar reduction effect of various saccharides was studied by the same method as in implementation example 1 (however, instead of sugar, 1 g/kg of starch that was heated and dissolved was orally administered). As a result, as shown in Table 2, a marked effect was seen for many saccharides.

Table 2

Sugar	Dosage (mg/kg)	Blood sugar reduction ratio (%) (a)	
		After 30 minutes	After 60 minutes
Konjak mannan	5	42	35
Citrus pectin	5	<10	<10
Carrageenan (made from *kappa*)	5	41	61

(a) Rise in blood sugar value 30 minutes and 60 minutes after starch administration (1 g/kg) is used as a reference.

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